maintaining the temperature profile of the wafer at substantially uniform temperatures, the resulting method can be used, for example, to effectively anneal a silicon wafer and/or thin films or layers formed thereon, as well as to form ultra-thin coatings and films on the wafer.

In the Office Action, claim 1 was rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,997,175 to Colelli, Jr., et al. in view of U.S. Patent No. 5,881,208 to Geyling, et al. Colelli, Jr., et al. is directed to using an in-situ closed loop real-time hot plate surface temperature monitoring system to control the hot plate surface temperature across various zones thereof. (Col 2, lines 49-53). The heating elements of the hot plate are grouped into individually adjustable heating zones that are adjustable in temperature to provide for control over the temperature extending across the hot place surface. (Col 2, lines 60-67 and Col 3, lines 1-2).

However, as noted by the Examiner, Colelli, Jr., et al. fails to provide a gas to selectively control the temperature. In addition, Colelli, Jr., et al. also fails to disclose or suggest a thermal processing chamber that is in communication with a plurality of lamps to heat the wafer during at least one heating stage. In particular, Colelli, Jr., et al. utilizes a "hot plate" that is in direct contact with the bottom surface of the wafer. In contrast, claim 1 utilizes lamps, which do not directly contact a wafer surface but instead emit radiation to heat the wafer from a distance.

Traditionally, it was thought that lamps could not provide adequate temperature uniformity of a wafer during a heating cycle. To the contrary, as evidenced by the above-cited references, it was thought that direct contact heating methods were required to provide the desired temperature uniformity. However, as a result of the

present invention, it has been discovered that the benefits of both lamp and direct contact heating can be achieved. Specifically, by utilizing lamps, much higher heating and cooling rates can be achieved than other heating devices, such as electrical elements or furnaces. (Appl. pg. 11, lines 6-14). Moreover, by providing a gas to selectively control the temperature of at least one localized region, temperature uniformity can be achieved that rivals the temperature uniformity capable of being achieved using electrical heating elements that directly contact the wafer. Thus, at least for the reasons set forth above, Applicants respectfully submit that Colelli, Jr., et al. fails to disclose or suggest at least one limitation of the present claims.

Furthermore, in the Office Action, Geyling, et al. was cited in combination with Colelli, et al. to render obvious independent claim 1. Geyling, et al. describes an apparatus that includes at least one heating element in opposed to a silicon wafer backside. The heating element may be comprised of, for example, a plurality of segmented resistive low-mass heaters. (Col 2, lines 26-33). However, in contrast to independent claim 1, Geyling, et al. fails to disclose or suggest a thermal processing chamber that is in communication with a plurality of lamps to heat the wafer during at least one heating stage. Specifically, similar to Colelli, Jr., et al., Geyling, et al. also utilizes an electric heating element that is in direct contact with the bottom surface of the wafer. In contrast, claim 1 utilizes lamps, which do not directly contact a wafer surface, but instead emit radiation to heat the wafer from a distance. An indicated above, such a difference is not merely a design choice, but is a significant distinction between claim 1 and the above-cited references.

In fact, Geyling, et al. actually recognizes the stark distinction between the use of lamps and electrical heating elements by stating the following:

> In current commercial RTP systems, wafer heating is generally accomplished using electrically-powered lamp elements which radiate high intensity thermal energy from an extended distance onto the surface of the wafer. It would be desirable to utilize a more controllable heating technique, as lamp heating has several major disadvantages. First, it is difficult to irradiate the wafer uniformly and thereby attain a uniform wafer temperature. (emphasis added) (Col 1, lines 41-48).

Moreover, Geyling, et al. also states that the "the thermal block 20 has distinct advantages over prior lamp heating systems for RTP". (Col 4, lines 62-63).

Thus, Geyling, et al. clearly teaches away from using a thermal processing system that utilizes lamp heaters as required by claim 1. Contrary to the above-cited references, the present inventors have discovered that such lamp heaters can in fact be utilized in accordance with the present invention to provide temperature uniformity across the wafer during a heating cycle. As such, Applicants respectfully submit that claim 1 patentably defines over the above-cited references for at least the reason that such references, taken singularly or in any proper combination, fail to disclose or suggest at least one limitation of claim 1.

In addition, the above-cited references were also combined to reject dependent claims 2 and 4-13. Applicants respectfully submit, however, that at least for the reasons indicated above relating to corresponding independent claim 1, claims 2 and 4-13 patentably define over the references cited. However, Applicants also note that the patentability of dependent claims 2 and 4-13 certainly does not hinge on the patentability of independent claim 1. In particular, it is believed that these claims possess features that are independently patentable, regardless of the patentably of claim 1.

In summary, it is respectfully submitted that the claims as presently amended are patentably distinct over the prior art of record. Thus, it is submitted that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested. Examiner Lee is invited and encouraged to telephone the undersigned at her convenience should any issues remain after consideration of the present response.

Please charge any additional fees required by this amendment to Deposit Account No. 04-1403.

Respectfully submitted,

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APPENDIX A

1. (Twice Amended) A method for heat treating a semiconductor wafer, said method comprising the steps of:

placing a semiconductor wafer in a thermal processing chamber that is in communication with a plurality of lamps, said semiconductor wafer defining a plurality of localized regions along a radial axis;

adjusting the temperature of said semiconductor wafer to a predetermined temperature according to a predetermined heat cycle, said predetermined heat cycle including a heating stage in which said semiconductor wafer is heated by said plurality of lamps;

during at least one stage of said predetermined heat cycle, providing a gas to selectively control the temperature of at least one of said localized regions of said semiconductor wafer to minimize temperature deviation of said at least one localized region from said predetermined temperature.